ASSESSMENT OF THE UTILITY OF EPISODES OF ILLNESS AS A TOOL FOR AMBULATORY RESOURCE ALLOCATION WITHIN THE UNITED STATES MILITARY HEALTH CARE SYSTEM

Contract Number: MDA903-88-C-0071
Task Order No. 6-89/90

Task Order Proponent: Lieutenant Colonel Stuart W. Baker, M.S.

Submitted To:

U.S. Department of Defense
Office of the Assistant Secretary of Defense
Health Affairs
Three Skyline Place, Room 1507
5201 Leesburg Pike
Falls Church, VA 22041-3201

This document was prepared for Birch & Davis Associates, Inc., by Paul Mermelstein, Project Director; David Bodycombe, Project Manager; Scott Armstrong, Lead Project Analyst; and Jim Love, Project Analyst; and for Solon Corporation by James Vertrees, Senior Research Analyst; Donna Mahoney, Research Analyst; K.C. Mitchell Research Analyst; and John Nikirk, Program Analyst.

August 9, 1991

Birch & Davis Associates, Inc.
8905 FAIRVIEW ROAD
SUITE 300
SILVER SPRING, MARYLAND 20910
(301) 589-6760

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	9 August 1991	

4. TITLE AND SUBTITLE
ASSESSMENT OF THE UTILITY OF EPISODES OF ILLNESS AS A TOOL FOR AMBULATORY RESOURCE ALLOCATION WITHIN THE UNITED STATES MILITARY HEALTH CARE SYSTEM

5. FUNDING NUMBERS
MDA903-88-C-0071
TA-6-89/90

6. AUTHOR(S)
Birch&Davis Associates, Inc.
Task Order Proponent: Stuart W. Baker, LTC, MS, USA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Birch&Davis Associates, Inc.
8905 Fairview Road
Suite 300
Silver Spring, MD 20910

8. PERFORMING ORGANIZATION REPORT NUMBER
MDA903-88-C-0071

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
OASD/HA/HSO/RAMS
3 Skyline Place, Suite 1507
5201 Leesburg Pike
Falls Church, VA 22041-3203

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for Public Release: Distribution is Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This report represents an assessment of the utility of episodes of illness as a tool for ambulatory resource allocation within the Military Health Services System (MHSS). Episodes of illness were defined to represent sequential and temporally associated health care services for treatment of a specific illness. An episode could represent a single office visit for an acute condition, or multiple visits for a chronic condition. For the latter case, time periods must be predefined, e.g. one year. Resources can be allocated in terms of norms associated with a particular episode or in accordance with clinical standards.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Episodes of Illness; Episode of Care; Ambulatory Resource Allocation; Military Health Services System Resource Allocation; CHAMPUS Episodes of Illness; USTF Episodes of Illness.	39
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

CONTENTS

INDEX OF EXHIBITS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The following report represents an assessment of the utility of episodes of illness as a tool for ambulatory resource allocation within the Military Health Services System (MHSS). The organization of this executive summary parallels that of the overall report and includes the following segments:

- Introduction
- Conceptual Background
- Methodology
- Results
- Discussion

This report presents results of an assessment of the potential utility of episodes of illness as the basis for allocating ambulatory care resources to providers within the MHSS.

1. INTRODUCTION

The MHSS Coordinated Care Program (CCP) is placing greater responsibility on local Medical Treatment Facility (MTF) commanders to provide for the total health care needs of all MHSS beneficiaries within a defined catchment area. It is critical to the success of the CCP that MTF health planners have the necessary tools to manage the allocation of health care resources effectively. The DoD has already developed a resource allocation methodology based upon Diagnosis Related Groups (DRGs) for inpatient care. An analogous tool for outpatients must also be developed.

2. CONCEPTUAL BACKGROUND

Episodes of illness can encompass a time period over which a patient experiences symptoms or signs that are perceived as sickness or ill health. Given that our ability to define an episode is limited to data on the provision of health care services, we have chosen to focus on episodes of care that represent sequential and temporally associated health care services that either requested by the patient or provided to treat a specific illness. Using this definition, an episode could represent a single office visit for an acute condition such as influenza or multiple visits for a chronic condition such as hypertension. For the former condition, the beginning and end points of the episode are distinct. In the latter, the time period would be predefined, e.g., one year. Resources could be allocated in terms of the norm associated with a particular episode or in accordance with clinical standards. Special resource allocation provisions may be instituted to reflect specific episodes that exceed standard levels of care.

3. METHODOLOGY

This assessment of episodes is based upon available DoD databases, specifically:

- Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) Database
- Uniformed Services Treatment Facilities (USTF) Database

These data sources have been used with success in our prior assessment of the utility of Ambulatory Visit Groups (AVGs)[1], one of the prevailing ambulatory case-mix classification methodologies. Unlike such mature technologies as AVGs, episodes of illness are still very much in a conceptual stage of development. A review of the literature revealed no successful attempt to exhaustively categorize ambulatory care in to discrete episodes. Our intent is to determine whether episodes of care can be derived from the available data. In the process of developing episodes for one or more illnesses, we expect to uncover some of the problems that will need to be addressed in future more comprehensive efforts. To facilitate these efforts, we will identify strategies to aid in the resolution of the problems that are identified.

To test our ability to develop episodes of care using the CHAMPUS and USTF databases, we selected several candidate diseases, as defined by Ambulatory Visit Groups (AVGs), for which to create episodes. This method narrows the analysis to a clearly defined set of cases. The assumption is that, if episodes can be created and used to allocate resources for treatment of the candidate diseases, with further research it may be possible to create episodes for more diseases or conditions.

Criteria for selection of candidate diseases/conditions were established as follows:

- Importance for the DoD (high volume or resource intensive)
- Well-defined symptom(s)
- Standard and accepted course of treatment(s)
- Limited duration, preferably less than one year
- Discrete begin and end points

Use of the above criteria and a review of our previous assessment of AVGs[2] led to the final selection of AVG 806 (Wound, Fracture of Arm, Lower Leg, Shoulder) for analysis.

Due to the likelihood of multiple, nonrelated health problems and other complicating issues, we established bounding rules for defining these episodes:

- Candidate AVGs will be considered trigger AVGs that indicate a possible episode of care.

- Presence of unrelated care before the first occurrence of a trigger AVG indicates the definite start of an episode.

- Absence of unrelated care prior to the first occurrence of a trigger AVG indicates a *possible* start of an episode.

- The end of an episode is determined by the presence of unrelated care after the last treatment associated with the AVG.

---

[1] *Assessment of the Utility of Ambulatory Visit Groups (AVGs) as a Tool for Ambulatory Resource Allocation within the United States Military Health Care System*, B&D/Solon, August 6, 1991.

[2] Ibid.

The presence of multiple problems within an episode could complicate resource allocation for care. Thus, assuming diagnosis and procedure coding is sufficiently complete to allow for identification of concurrent problems, such cases will be excluded from the analysis. If episodes are determined to be a viable option for resource allocation, methods for handling multiple problems within an episode will have to be developed.

4. RESULTS

All encounters for an individual who had at least one trigger AVG were examined. Our analysis concentrated on AVG 806 (Wound, Fracture of Arm, Lower Leg, Shoulder) as a trigger AVG. We chose AVG 806 in order to represent an episode of illness requiring multiple encounters, yet whose time span might not exceed the period of the data sets (CHAMPUS: one fiscal quarter; USTF: one year). We were able to successfully define and recognize episodes for AVG 806 in both data sets.

Once it was clear that episodes could be located in a given data set, the key problem was determining when an episode had begun and ended, i.e., whether the apparent episode was complete. Since broken bones, and broken arms in particular, require less than six months to heal, knowing that the initial visit was more than six months from the end of the data implied that we had a complete episode. However, as the episode may have been completed elsewhere, we could not rely on this as an indicator for either of the two data sets. Therefore, we considered two alternatives:

- Use CPT-4 codes to define episode begin and end points
- Use AVG codes to define episode begin and end points

In considering of the first alternative, there are specific codes for setting a bone and removing a cast. However, these codes were not routinely recorded for encounters in the two data sets. We then examined the second alternative of using the presence of unrelated AVGs before and after encounters for AVG 806 to define complete episodes. This second alternative proved feasible.

Using AVG 806, we were able to create a series of episodes that appeared to make clinical sense in that the procedures seemed appropriate, the intensity of resource use appeared to diminish over time, and the interval between visits grew as the case resolved. However, while the chosen cases exemplified the process required to create illness episodes, they were also exemplary of some of the types of problems likely to be encountered in such efforts, including the:

- Inability to consistently identify definitive start and end points
- Need for complete and accurate diagnostic and procedure data
- Potential lack of clinical specificity in the AVGs
- Need for clinician input

The analysis was also limited by the types of data that were available. The USTF database was constrained in its procedural detail and the CHAMPUS data was constrained in terms of its time period--three months.

5. DISCUSSION

Several important conclusions regarding episodes of care can be drawn based on this analysis:

- AVGs alone are not useful in developing episodes. They group together body systems (arms and legs) that, while similar for a single visit, require quite different patterns of care. When multiple procedures are performed during a visit, AVGs are still assigned using only the diagnosis and principal procedure. If a secondary procedure, related to the episode in question, this information would not be included in the analysis files.

- An episode of care's begin point should be based on a specific event, such as a specific CPT-4 code, though other indicators can be used for research purposes.

- Specific episode delineations need to include at least patient age. Clearly, older patients require much more rehabilitative care for at least some conditions than younger people. A broken leg may be quite serious for an elderly adult, but not for a child.

Perhaps most important, this work raises the issue of the basic strategy that should be employed in considering episodes of care. Two strategies are possible. The first strategy used the DRGs (and the AVGs) as the basic model. Here the definition includes all services within the episode even when certain services are provided only to some of the individuals involved. For example, if one were to define "broken leg" as an episode, then whirlpool treatment *would be included in* this definition at some fractional allocation rate because this is provided to older people with broken legs but not to younger people. This particular problem can be handled by using age as one of the classification dimensions.

However, how should an expensive yet necessary test, performed for one in one thousand cases, be handled? This problem requires a different strategy such as the APGs "partial visits" approach. In this case, one could define clinically coherent episodes of care that would be applicable to the bulk of care provided. In addition, one would provide additional resources for unusual cases where special tests (etc.) were needed. This stratagem incorporates potential resource utilization outliers into the process of defining the categories, rather than adjusting the system later with allocation policies. This would greatly simplify the problem of defining specific episodes since unusual cases can be included while preserving their uniqueness.

The benefits of adopting an episode case-mix classification approach for enhanced clinical management and resource allocation are very large, and one does not need to cover 100 percent of the cases in order to reap these benefits. In terms of utility to the DoD coordinated care initiative, episodes are of particular interest in that they are more inclusive, and thus potentially more applicable to capitation, than other potential case-mix classification schemes that have been considered. They are not a panacea; depending on the design of the resource allocation mechanism, they may induce providers to draw greater distinctions between visits in terms of diagnoses in order to get credit for the more resource intensive episodes, as well as possibly reducing efficiencies realized in the treatment of multiple conditions during one visit. Nonetheless, episodes of illness warrant further pursuit as a potential clinical management and resource allocation tool for the future.

CHAPTER I

INTRODUCTION

I. INTRODUCTION

The Office of the Assistant Secretary of Defense-Health Affairs (OASD-HA) is currently embarking on the implementation of a Coordinated Care Program (CCP) for the Military Health Services Systems (MHSS). The CCP represents a major overhaul of the MHSS that places greater responsibility for the management of health care services on local MTF commanders. Although their decisions will be centrally monitored, MTF commanders will be responsible for managing health care delivery, cost, and quality of care in their catchment areas.

In order to manage care effectively, the MTF commanders will need additional tools to support the allocation of health care resources. The DoD has already developed a resource allocation methodology based upon Diagnosis Related Groups (DRGs) for inpatient care. An analogous tool for outpatients must also be developed. Such a system would have far-reaching implications for the MHSS, affecting the collection, reporting, and use of ambulatory care data.

For DoD to select among alternative case-mix classification systems will require careful consideration of a number of issues that include how well the classification system encompasses the types of services provided, accommodates case-mix, reflects the use of ancillary care personnel, reflects the actual levels of health resource use, and reflects the unique properties of the MHSS. In general, ambulatory case-mix methodologies group together certain provider visits or procedures that can be expected to require similar levels and types of resources.

Birch and Davis Associates, Inc. (B&D), and the Solon Consulting Group previously assessed the utility of basing allocation levels on one such case-mix measure, Ambulatory Visit Groups (AVGs).[1] Comparable classification schemes include Ambulatory Patient Groups, Products of Ambulatory Care, and Emergency Department Groups.

AVGs, and most other outpatient case-mix measures, are visit based. That is, each visit to a health care provider is categorized into a group of clinically similar visits. An alternative classification unit, based upon episodes of illness, combines all visits and all other services required to treat a given disease or condition. For some conditions (influenza, for example), a single visit to a doctor might comprise the entire care provided for that episode of illness. Other conditions or diseases might require multiple visits over a distinct period of time. For example, a normal pregnancy includes prenatal care, the delivery, and any follow-up care related to the pregnancy. Though the care for an extremely premature infant would not be included in the pregnancy episode, a follow-up visit for postpartum depression would. Still other conditions, such as hypertension, might cover care that continues indefinitely. In this case, the episode might arbitrarily be the care required for this condition for one year. Thus, this episode resembles capitation but is still significantly different. Capitation rates are usually based on demographic, not medical, factors, and an episode-based allocation would be increased for the hypertensive patient if this patient also broke an arm. That is, the care required for the broken arm is another episode. A patient may have multiple episodes at the

[1] *Assessment of the Utility of Ambulatory Visit Groups (AVGs) as a Tool for Ambulatory Resource Allocation within the United States Military Health Care System*, B&D/Solon, August 6, 1991.

same time or no episodes at all during a given year. Under a resource allocation system based on episodes, allocation levels should encompass all provider visits and procedures required to treat a condition/disease throughout their usual course of treatment.

This report presents the results of our preliminary analysis of the feasibility of using a case-mix classification system based upon episodes of illness in ambulatory care resource allocation. The report begins by addressing the conceptual and definitional issues that are associated with illness episodes. An ensuing discussion of our methodology is followed by a presentation of episodes derived from this analysis using DoD data sources. The concluding discussion considers the potential limitations of an episodes-based resource allocation approach as well as its future application within the MHSS.

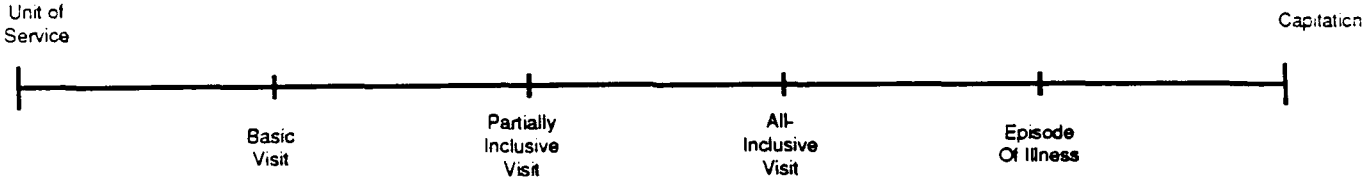
CHAPTER II

CONCEPTUAL BACKGROUND

II. CONCEPTUAL BACKGROUND

A resource allocation grouping methodology must endeavor to predict ambulatory care resource use by combining groups of patient visits that are similar in terms of the demographic, diagnostic, and therapeutic characteristics that influence their level of resource use. As part of this project we are examining case-mix classification schemes, such as Ambulatory Visit Groups and Ambulatory Patient Groups, which are visit based. Specifically, the unit that is used to measure resource use is a patient visit. However, defining what is meant by "visit" can be difficult. A visit is commonly used to represent a face-to-face meeting with a health care provider to receive health care services. However, if the patient is sent elsewhere in the clinic to receive additional diagnostic testing (for example, an EKG or chest x-ray), the visit becomes less distinct. For example, if the radiologist immediately interprets the results for the patient, is this a separate visit? Thus, a visit may be a somewhat arbitrary unit of analysis.

The unit of measure upon which a classification scheme is based can be defined at a number of points:



The choice of units has important implications for incentives to control the use of health care resources. At the far left of this continuum, separate allocation rates would be estimated for each service provided, as in a fee-for-service system. This approach relieves providers of all financial risk; however, it includes no incentive to contain costs. Alternatively, the Basic Visit, Partially Inclusive Visit, and All-Inclusive Visit models create incremental increases in both provider risk and cost-control incentives. Ambulatory Patient Groups employ the Partially Inclusive model in that additional resources are allocated for certain secondary or ancillary procedures that may not normally be part of the standard course of treatment for the disease in question. These types of procedures would be included in the allocation rate under Ambulatory Visit Groups, which represent an All-Inclusive model.

Capitation, at the far right of the continuum, provides the greatest incentive to control costs but also places providers at great risk by allocating a single rate to cover all services provided to a patient over a set period of time (e.g., one year). Episodes of care represent a compromise relative to capitation in that allocation rates cover all services associated with the course of treatment for a particular disease or condition over a period of time. Thus, unlike a capitated system, the allocation is specific to the disease/condition so that varying treatment costs associated with different health problems are taken into account. For example, procedures and costs associated with a general physical examination differ considerably from those associated with the treatment of a broken bone. Further, episodes represent a rational model of the process of delivering health care. Standard courses of treatment for many diseases or conditions involve a *series* of physician visits, laboratory or radiology procedures, pharmaceutical supplies, outpatient surgeries, or inpatient surgeries and admissions. Thus, it is logical to allocate resources for care based on these established series. Episode-based payment has long been the goal for certain conditions, for example, uncomplicated pregnancy under CHAMPUS.

Prior Research

A thorough review of the literature pertaining to episodes of care and resource allocation or prospective payment resulted in the identification of relatively little prior work in this area. For the most part, studies focused on defining episodes as a means of identifying the content of health care. Several researchers developed methods to assign costs to episodes.

For example, Gold and Azevedo (1982) used Health Maintenance Organization (HMO) data to define episodes for acute (upper respiratory infection, urinary tract infection), chronic (hypertension), symptomatic (abdominal pain, chest pain), and preventive (physical examination) conditions. Specific rules for excluding or including certain comorbidities or services and time intervals between associated visits were developed. Other researchers have defined episodes for obesity (Johnson et al. 1984), psychiatric care (Kessler et al. 1980), and otitis media and sore throat (Moscovice 1977, Salkever et al. 1982). Again, each researcher established procedures for handling comorbidities, multiple providers, timing of visits, and other problems.

Several researchers were able to assign costs or other resource use measures to defined episodes. Garnick et al. (1990) used claims data, while Gold and Azevedo (1982) used the California Relative Value Schedule as a proxy for costs to measure intensity of services. Lasdon and Sigmann (1977) developed an artificial construct representing visit frequency and laboratory test utilization to assign costs to hypertension episodes. Salkever et al. (1982) used provider time and costs of ancillary services and drugs to estimate episode costs. Finally, Moscovice (1977) developed lists of resources (and associated charges) realistically used to treat a specific health problem or related comorbidity.

Although the types of episodes defined by these researchers were often similar (e.g., Garnick et al., Gold et al., and others considered hypertension), the processes and standards used varied considerably. In other words, episodes can be defined in several different ways and can encompass varying periods of time. Perhaps the best description of three alternative definitions is provided by Hornbrook et al. (1985):

- **Episode Of Disease**--Starts with a clinical specification that a disease is present (diagnosis) and ends with specification that the disease is resolved. However, symptoms may be caused by an unrecognized disease or by multiple concurrent diseases. Thus, appropriate diagnoses are imperative.

- **Episode Of Illness**--A single, unbroken interval of time during which the patient suffers from a continuous spell of signs or symptoms that are perceived (by the patient) as sickness or health. The episode ends when the symptoms are no longer present, although the disease itself may actually only be in remission.

- **Episode Of Care**--A series of temporally contiguous health care services related to treatment of a given spell of illness or provided in response to a specific request by the patient or other relevant entity. Episodes of care may not be provided due to illness or disease but instead could correspond to an erratic pattern of a patient's request(s) for care.

The interaction between these three types of episode definitions is illustrated in Exhibit II-1. As the diagram shows, episodes of disease can exist independent of episodes of illness, and vice versa. For example, a person diagnosed with hypertension may have had this condition some time before the diagnosis was made, and may continue for years with symptoms that periodically disappear. Thus, there would be multiple episodes of illness associated with one episode of disease. Alternatively, while a patient might think he/she is suffering solely from one condition, a provider may determine that an additional disease has appeared. In this case, there would be multiple episodes of diseases within the same episode of illness. The same logic holds true for episodes of care.

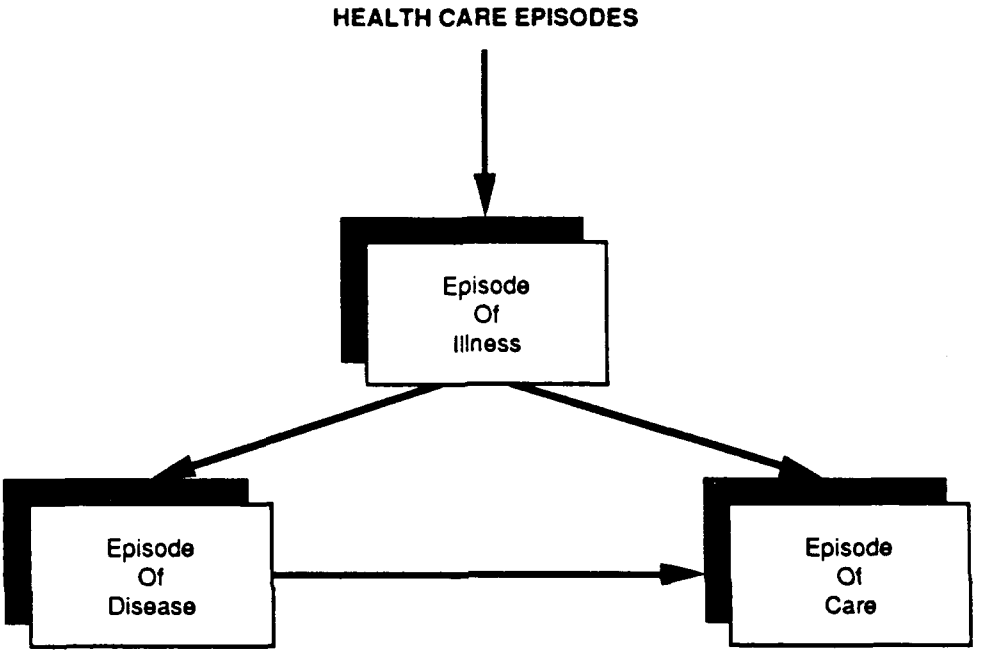
The type of episode selected for use depends on one's purpose. In all cases, four elements should be measured to completely define episodes for specific diseases/conditions. These are:

- **Timing**--Starting point, duration, and ending point
- **Nature Of The Problem**--Diagnosis, manifestations, rate of progression
- **Resource Use**--Diagnostic testing and other measures, treatment regimen, and case management
- **Outcome**--Clinical outcome (cure and resolution), functional abilities, and symptom remissions

Since our data sources support analysis of resource utilization of the health care services provided upon entry into the MHSS system by its beneficiaries, our assessment will be based upon the episode-of-care definition. Of the three episode definitions described, episodes of care is the most applicable in the context of resource allocation because they are based upon documented patterns of health services utilization. If the service population remains demographically stable, then utilization will also remain stable unless there is a change in the health benefits package. Practically, this is also the only approach that can be readily assessed using existing data sources that are not truly population based. We will define an episode of care as beginning when an individual is first seen by a provider (as evidenced by a diagnosis and encounter date) and ending when the last service provided, in relation to that diagnosis, is identified.

EXHIBIT II-1

TYPES OF HEALTH CARE EPISODES



CHAPTER III

METHODOLOGY

III. METHODOLOGY

Our approach to the analysis of episodes of illness, including a description of our data sources, is discussed below.

The data sources are the same as those used previously to assess the utility of AVGs. Since episodes of care are at a very preliminary stage in their conceptual development, our analytical methods will differ from our prior analyses in that there is no "episode grouper" currently available for use. Thus, our intent is to determine whether episodes of care can be found in the data available to this project. In the process of seeking episodes of care, we expect to uncover some of the problems that will be encountered in future attempts to pursue this concept. In addition, we will identify strategies to aid resolution of these problems.

Data Sources

Analysis files specific to this assessment have been developed from two data sets that contain information on the provision of ambulatory care services to DoD beneficiaries: the Uniformed Services Treatment Facility (USTF) database and the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) database. These data sets are fiscally driven; thus, records may reflect multiple visits or portions of visits. In order to use these data to assess the utility of resource allocation case-mix measures, the files must be encounter based. That is, each record must represent a single complete visit and include a diagnosis, a primary procedure, and associated secondary procedures. The two data sets and the processing steps completed to developing encounter-based analysis files are briefly described below. Detailed descriptions can be found in *Comparative Analyses of Ambulatory Morbidity in Four Patient Populations*, Appendices A and B (Birch and Davis, March 1991). The third data set available for this study, the ACDB, was excluded from the analysis because it contains a 50 percent sample of visits for the span of time covered by the database. Therefore, any episodes developed using this data would be incomplete and useless for this analysis.

USTF Database

- **General Description**--This database includes ambulatory and inpatient care data collected on a monthly basis from the 10 USTFs for one fiscal year, primarily during 1988. The data were originally used to ensure appropriate reimbursement for beneficiaries and to document service utilization patterns. As in the CHAMPUS database, there are proportionately more females than males; however, the USTF data include active-duty personnel. Over 75 percent of the encounters are for adults, most over the age of 30 years. The most frequent diagnoses are related to routine examinations and hypertension. As one might expect, the most common procedures involve routine care for new or established patients.

- **Data Record**--The ambulatory care records contain facility, patient, sponsoring beneficiary and provider characteristic, date of service, procedure, and associated diagnosis variables for each outpatient service provided.

- **Processing**--Records in the source data set were comprised of several segments, including a patient demographic segment, up to six outpatient segments, and an inpatient segment. Inpatient data were excluded at this stage of the analysis due to its emphasis on ambulatory care. However, the comprehensive development of illness episodes will eventually have to address all patient care, inpatient and outpatient. As the outpatient segments could represent multiple service dates, processing involved separating the segments into individual records, assimilating the data into encounter records. This was accomplished by:

  - For each service date, identifying each individual patient by using the patient account number, sex, and year of birth

  - Matching "from" and "to" service dates within each outpatient segment

  - Verifying existence of an associated service date for each outpatient segment (if missing, service date from the next or previous segment was used)

  - Assigning all outpatient segments for a given date to one visit record, including the appropriate patient demographic information on each record

CHAMPUS Database

- **General Description**--This database consists of claims data from provision of health services to eligible civilian DoD beneficiaries (e.g., military retirees and dependents). No active-duty personnel are included; ambulatory visit claims for females exceed claims for males, particularly for persons aged 20 to 44 years. The most frequent diagnoses include mental disorders (neurotic depression, adjustment reaction), otitis media, and hypertension. The most frequently performed procedures are related to routine office-based care to new and established patients and to psychiatric care.

- **Data Record**--The records contain information on claim identification, finance and payment, hospital/clinic encounter characteristics, sponsor and patient demographic characteristics, and provider characteristics.

- **Processing**--The base files are comprised of one fiscal quarter of professional services claims records from 1987 and 1988. Initial processing of records involved an assessment of data quality, converting source data to a SAS data set, and excluding certain records. Claims that were fully or partially denied, whose sponsoring branch was NOAA, or that were for inpatient care or drugs were excluded. Records in the resultant database include patient and provider demographics, diagnosis, procedures, notations indicating claim submission for payment or billing reconciliation, and a visit count and services count for each procedure. These records were then converted to encounters by:

  - Combining each procedure associated with a claim with all of its re-submittal data to create summary procedure records

- Excluding records that did not include a primary or secondary procedure

- Assigning secondary procedure records to a primary procedure record, matching patient, provider, diagnosis, and period of care.

Analytic Approach

Before episodes of care can be defined from patient data, there must exist some means of identifying the illness or reason for care. This includes establishing that a particular patient may be involved in an episode of interest to the study, and establishing an unambiguous begin and end point for the episode of care. The fact that our data sets cover fixed time periods adds to the difficulty in that the first visit for a given condition by a particular patient might be the last visit for the episode, the other visits having occurred prior to the time covered by the data. Likewise, the end of an episode for a patient might be hidden by the end of our data. These problems are called left and right censoring, respectively.

Although diagnosis or procedure codes could theoretically be used for episode definition, the sheer size and complexity of the coding systems would be difficult to manage. It would also require that a large number of related CPT and ICD codes be aggregated to capture a broad illness category. An alternative is to use a case-mix classification system, such as Ambulatory Visit Groups or Ambulatory Patient Groups, to identify a broad illness and/or condition and to identify the triggering event that can be used to define the beginning of an episode. As described in a previous study report,[1] one AVG is assigned to each ambulatory visit, based primarily on principal diagnosis and associated procedures. Since AVGs can identify the main reason for provision of ambulatory care, they should be useful in defining episodes of care that involve only outpatient treatment.

To test our ability to develop episodes of care using the CHAMPUS and USTF databases, we selected several candidate diseases, as defined by AVGs, for which to create episodes. This method narrows the analysis to a clearly defined set of cases. The assumption is that, if episodes can be created and used to allocate resources for treatment of the candidate diseases, with further research it may be possible to create episodes for more diseases or conditions. However, if episodes cannot be developed for these candidates, the utility of basing resource allocation on episodes of care might be highly questionable.

Criteria for selection of candidate diseases/conditions were established. These are:

- Importance for the DoD (high volume or resource intensive)
- Well-defined symptom(s)
- Standard and accepted course of treatment(s)
- Limited duration, preferably less than one year
- Discrete begin and end points

---

[1] *Assessment of the Utility of Ambulatory Visit Groups (AVGs) as a Tool for Ambulatory Resource Allocation within the United States Military Health Care System.* B&D/Solon, August 6, 1991.

Use of the above criteria and a review of our previous assessment of AVGs[2] led to the final selection of AVG 806 (Wound, Fracture of Arm, Lower Leg, Shoulder) for analysis.

In order to define episodes of care for the candidate AVGs, an analysis sample was developed by identifying all patients, in both the CHAMPUS and USTF databases, with the candidate AVG. All records for these patients, whether related to the AVG or not, were then selected and organized into a person-based time line by date of service.

Due to the likelihood of multiple, nonrelated health problems and other complicating issues, we established the following rules for defining these episodes.

- Candidate AVGs will be considered trigger AVGs that indicate a possible episode of care.
- **Presence** of unrelated care before the first occurrence of a trigger AVG indicates the definite start of an episode.
- **Absence** of unrelated care before the first occurrence of a trigger AVG indicates a *possible* start of an episode.
- The end of an episode is determined by the presence of unrelated care after the last treatment associated with the AVG.

These rules allow inherent complexities to be identified and handled within the analysis data set. For example, by defining an episode as "possibly" starting with the presence of a trigger AVG absent prior unrelated care, left censoring (actual start of episode may have begun prior to time period covered by data) is recognized. Similarly, right censoring (episode ending after the covered time period) is recognized by not closing the episode for unrelated care before the next expected treatment date. The presence of multiple problems within an episode could complicate resource allocation for care. Thus, assuming diagnosis and procedure coding are sufficiently complete to allow for identification of concurrent problems, such cases will be excluded from the analysis. If episodes are determined to be a viable option for resource allocation, methods for handling multiple problems within an episode will have to be developed.

Limitations

There were several significant limitations to this study. The most important concern our ability to track an individual over time. The data available to this project allowed tracking of an individual's outpatient care within a discrete segment of the MHSS. While we could track someone's use of ambulatory services under CHAMPUS, we could not track inpatient service use nor use of ambulatory services at PRIMUS/NAVCARE or at MTFs. In addition, the time period covered by the data was limited so that partial episodes were likely more common than if we used a more complete data set.

[2]Ibid.

CHAPTER IV

RESULTS

IV. RESULTS

All encounters for an individual who had at least one trigger AVG were examined. Our analysis concentrated on AVG 806 (Wound, Fracture of Arm, Lower Leg, Shoulder) as a trigger AVG. We chose AVG 806 in order to represent an episode of illness requiring multiple encounters, yet whose time span might not exceed the period of the data sets (CHAMPUS: one fiscal quarter; USTF: one year). We were able to successfully define and recognize episodes for AVG 806 in both data sets.

Once it was clear that episodes could be located in a given data set, the key problem was determining when an episode had begun and ended, i.e., whether the apparent episode was complete. Since broken bones, and broken arms in particular, require less than six months to heal, knowing that the initial visit was more than six months from the end of the data implied that we had a complete episode. However, as the episode may have been completed elsewhere, we could not rely on this as an indicator for either of the two data sets. Therefore, we considered two alternatives:

- Use CPT-4 codes to define episode begin and end points
- Use AVG codes to define episode begin and end points

In considering of the first alternative, there are specific codes for setting a bone and removing a cast. However, these codes were not routinely recorded for encounters in the two data sets. We then examined the second alternative of using the presence of unrelated AVGs before and after encounters for AVG 806 to define complete episodes. This second alternative proved feasible.

Using this definition, we were able to observe complete episodes in both the CHAMPUS and USTF data sets. In addition, these episodes made clinical sense. For example, an older person with a broken leg will likely require extensive rehabilitation therapies while a younger person will not. Further, broken arms require fewer visits than broken legs for younger and older people. The data were found to support these statements.

A series of episodes that were developed as part of this analysis are presented in Appendix A. We have extracted one of these episodes, based on the USTF database and presented in Exhibit IV-1, to exemplify the episode creation process. The key features of this episode are as follows:

- AVG 847 indicates an injury to the forearm or elbow on 15 May 1987.
- A follow-up visit occurs on the fourth day after the initial injury.
- Two additional follow-up visits then occur at 10-day intervals.
- The last two follow-up visits occur at two-week intervals, concluding on 09 July 1987.
- No related services are found in the data file after 09 July 1987.
- An unrelated service appears on 11 August 1987, indicating that the end of the episode coincided with the 09 July 1987 visit.

EXHIBIT IV-1
USTF EPISODE

EPISODE DESCRIPTION:	Injured arm - Complete episode
EPISODE PERIOD:	05/15/87 to 07/09/87
AVGs FOUND IN DATA:	847 -- Forearm & elbow, class 2
	806 -- Wound, fracture of arm, lower leg, shoulder
	2316 -- Other factors influencing health status
DIAGNOSIS ASSIGNED:	813.42 -- Other fractures of distal end of radius (alone)
	V45.89 -- Other postsurgical status, other; presence of neuropacemaker or other electronic device
PATIENT AGE:	66

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
847	05/15/87	813.42	99064	Emergency care facility service: when the non-hospital-based physician is called to the emergency facility from outside the hospital to provide emergency services; not during regular office hours
806	05/19/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	05/29/87	813.42	99500	Special USTF code used for statistical purposes
806	06/09/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	06/23/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	07/09/87	813.42	90040	Office and other outpatient medical service, established patient; brief service
2316	08/11/87	V45.89	90060	Office and other outpatient medical service, established patient; intermediate service

Procedural coding was not very helpful in confirming the nature of the visit. Aside from the initial emergency medical procedure code, the remaining codes were generic, relating to routine office visits. This lack of procedural specificity is apparent throughout our examples for AVG 806. Thus, we were heavily dependent on diagnosis for establishing start and end points for episodes. Usually diagnosis alone will be sufficient for identifying an episode, but episode-based methodologies will need to address instances where multiple diagnoses of approximately equal importance are present. In such cases, the choice of diagnosis may be somewhat arbitrary and could cause an underestimation of required health care resources.

The visit interval for this example appears reasonable with a trend to a greater time interval between visits.

The example shown in Exhibit IV-1 is fairly "pure" in the sense that AVG 806 is assigned to the visits with considerable consistency. The third example provided in Appendix A, which is also based upon USTF data, includes four orthopedic AVGs. Further, in eight visits occurring in this example, the same visit diagnosis was only used twice. Thus, while the cited AVGs appear to be medically consistent with a single episode, this grouping would require confirmation by a clinician. The time span between visits is also an issue for this example since at one point nearly four months elapse between visits.

The CHAMPUS-derived examples are far richer in terms of their procedural data. Accurate recording of procedural data is of greater importance in this database since it is a basis for reimbursement. With the added detail, it is easier to follow the course of therapy and its variation in intensity as the condition resolves. These more complete data permit a much more confident determination of the episode boundaries. That these data present problems of their own is suggested by CHAMPUS Example 4 (see Appendix A). Given the nature of the claims data reported in CHAMPUS, it was sometimes necessary to define visits over a time interval rather than for a discrete date. Thus, this example shows a total of four visits that occurred sometime between August 13 and August 27.

At this stage in the analysis, the development of episodes was approached as a series of case studies. We were more concerned with the feasibility of establishing episodes within a range of widely varying alternative case histories. While these efforts contributed to the conceptual development of episodes, we didn't look at enough examples to establish the homogeneity of this particular AVG in terms of health care resources. It would be useful to further develop patterns of care for episodic "groups" that are similar in terms of patient characteristics and illness severity.

While the chosen cases are exemplary of the process required to create illness episodes, they are also exemplary of some of the types of problems likely to be encountered in such efforts, including the:

- Inability to consistently identify definitive start and end points
- Need for complete and accurate diagnostic and procedure data
- Potential lack of clinical specificity in the AVGs
- Need for clinician input

The analysis was hampered by the types of data that were available. The USTF, although it covers an entire year, lacks a lot of procedural detail to aid in establishing episodes. The CHAMPUS database, although rich in detail, was only available for one quarter. It is anticipated that efforts to establish viable episodes will be facilitated by the availability of CHAMPUS data that cover a longer time period.

CHAPTER V

DISCUSSION

V. DISCUSSION

We have shown that visits can be classified into clinically meaningful episodes for one candidate AVG. Yet the results indicate that there are several hindrances remaining to be overcome. These are:

- AVGs alone are not useful in developing episodes. They group together body systems (arms and legs) that, while similar for a single visit, require quite different patterns of care. Further, AVGs do not necessarily recognize patient age, which can affect the course of treatment. When multiple procedures are performed during a visit, AVGs are still assigned using only the diagnosis and principal procedure. If a secondary procedure related to the episode in question is performed, this information would not be included in the analysis files.

- An episode of care's begin point should be based on a specific event, such as a specific CPT-4 code, though other indicators can be used for research purposes.

- Specific episode delineations need to include patient age. Clearly, older patients require much more rehabilitative care for at least some conditions than younger people. A broken leg may be quite serious for an elderly adult but not for a child.

Perhaps most important, this work raises the issue of the basic strategy that should be employed in considering episodes of care. Two strategies are possible. The first strategy uses the DRGs (and the AVGs) as the basic model. Here the definition includes all services within the episode, even when certain services are provided only to some of the individuals involved. For example, if one were to define "broken leg" as an episode, then whirlpool treatment would be included in this definition at some fractional allocation rate because this is provided to older people with broken legs but not to younger people. This particular problem can be handled by using age as one of the classification dimensions.

However, how should an expensive yet necessary test, performed for one in one thousand cases, be handled? This problem requires a different strategy. The APGs define "partial visits." In a similar vein, one could define clinically coherent episodes of care--episodes that would be applicable to most cases. In addition, one would provide additional resources for unusual cases where special tests (etc.) were needed. This stratagem in a sense incorporates potential resource utilization outliers into the process of defining the categories, rather than adjusting the system later with allocation policies. This would greatly simplify the problem of defining specific episodes since unusual cases can be included while preserving their uniqueness.

Finally, we need to answer the question that motivated this part of this project: "Are treatment episodes potentially useful as an allocation strategy for the DoD?" Given the enormous potential advantages of care episodes as both a basis for comparing facility treatment patterns, particularly in the context of the DoD coordinated care initiative, and a natural management tool, a yes answer is desirable. Our results indicate that, indeed, this is the answer for some, but not all, cases. That is, one should not attempt to define

episodes that, like DRGs, AVGs, and APGs, include all of the cases. Instead, the DoD should take steps to begin to define episodes for about 80 percent of the cases.

However, to begin explicitly defining episodes for the majority of cases for the DoD, several data requirements should be met. These include:

- Data based upon complete representation of catchment area(s) populations
- Data spanning a period of time that is ample to determine definitive begin and end points
- Data from all components (direct and indirect) of the MHSS for identical time periods
- Data from both inpatient and outpatient segments of the MHSS
- Data with uniform, standardized, complete diagnostic and procedural coding

Given these improvements to the data, the definition of many more specific episodes is an achievable objective. Additionally, given better data, illnesses with varying length of care periods and resource usage should be examined, as should episodes whose care may cross over the inpatient-outpatient boundary. Simple episodes whose care may be described by one or two encounters should be included, as should complex episodes whose care may span many months. This would allow a better assessment of the problems to be overcome with a greater spectrum of illnesses. However, even if data were complete and accurate, these analyses would still be likely to have some problems to overcome:

- The differentiation of visits for a purportedly different reason/illness that include monitoring of an ongoing illness episode is not always clear.
- It is difficult, if not impossible, to unbundle services associated with non-episode related care when the principal diagnosis is for the episode of interest.
- Ultimately, it may require clinical input to identify endpoints, which will be difficult to implement.
- In a multicomponent health care system whose beneficiaries move relatively frequently, the continual changes of one's health care provider may inhibit the collection of comparable data.

In the future, and with better data, the utility of episodes of care for allocating ambulatory resources should be assessed based on the following criteria:

- **Ability To Predict Resource Use**--Do visits within each episode require similar levels and types of resources?
- **Ability To Measure Case**--Do episodes differentiate between types of visits in a predictable way?
- **Reasonableness Of Episode-Based Weights**--Do the relative values indicate differences among types of episodes? Is there a rationality to the hierarchy of procedures?

The benefits of this approach for enhanced clinical management and resource allocation are very large, and one does not need to cover 100 percent of the cases in order to reap these benefits. In terms of utility to the DoD coordinated care initiative, episodes are of particular interest in that they are more inclusive, and thus potentially more applicable to capitation, than other potential case-mix classification schemes considered to date. They should not be considered a panacea; depending on the design of the resource allocation mechanism, they may induce providers to draw greater distinctions between visits in terms of diagnoses in order to get credit for the more resource-intensive episodes, as well as possibly reducing efficiencies realized by the treatment of multiple conditions during one visit. Nonetheless, episodes of illness warrant further pursuit as a potential clinical management and resource allocation tool for the future.

APPENDIX A

USTF AND CHAMPUS EPISODES OF ILLNESS

USTF EPISODE
EXAMPLE 1

EPISODE DESCRIPTION: Injured arm - Complete episode
EPISODE PERIOD: 05/15/87 to 07/09/87
AVGs FOUND IN DATA: 847 -- Forearm & elbow, class 2
806 -- Wound, fracture of arm, lower leg, shoulder
2316 -- Other factors influencing health status
DIAGNOSIS ASSIGNED: 813.42 -- Other fractures of distal end of radius (alone)
V45.89 -- Other postsurgical status, other; presence of neuropacemaker or other electronic device
PATIENT AGE: 66

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
847	05/15/87	813.42	99064	Emergency care facility service: when the non-hospital-based physician is called to the emergency facility from outside the hospital to provide emergency services; not during regular office hours
806	05/19/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	05/29/87	813.42	99500	Special USTF code used for statistical purposes
806	06/09/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	06/23/87	813.42	90060	Office and other outpatient medical service, established patient; intermediate service
806	07/09/87	813.42	90040	Office and other outpatient medical service, established patient; brief service
2316	08/11/87	V45.89	90060	Office and other outpatient medical service, established patient; intermediate service

USTF EPISODE
EXAMPLE 2

EPISODE DESCRIPTION:	Fracture foot - Definite start
EPISODE PERIOD:	08/24/88 to 09/06/8
AVGs FOUND IN DATA:	806 -- Wound, fracture of arm, lower leg, shoulder
	106 -- Headache
DIAGNOSIS ASSIGNED:	307.81 -- Psychalgia; tension headache
	825.25 -- Fracture of other tarsal and metatarsal bones, closed; metatarsal bone(s)
PATIENT AGE:	First visit -- 29. Second through fourth visits -- 30.

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
106	08/27/87	307.81	99500	Special USTF code used for statistical purposes
806	08/24/88	825.25	90015	Office and other outpatient medical service, new patient; intermediate service
806	08/25/88	825.25	99500	Special USTF code used for statistical purposes
806	09/06/88	825.25	90060	Office and other outpatient medical service, established patient; intermediate service

USTF EPISODE
EXAMPLE 3

EPISODE DESCRIPTION: Sprain of ankle with complications
EPISODE PERIOD: 03/28/87 to 09/11/87
AVGs FOUND IN DATA:
809 -- Sprain of arm, lower leg, shoulder
806 -- Wound, fracture of arm, lower leg, shoulder
803 -- Degenerative and infective joint disease
807 -- Orthopedic aftercare
2314 -- Partial physical exam
2300 -- General medical exam
DIAGNOSIS ASSIGNED:
845.00 -- Sprains and strains of ankle; unspecified site
824.8 -- Fracture of ankle; unspecified, closed
718.17 -- Loose body in joint (joint mice); multiple sites
829.0 -- Fracture of unspecified bone, closed
V54.9 -- Unspecified orthopedic aftercare
V70.3 -- Other medical examination for administrative purposes
V70.9 -- Unspecified medical examination
PATIENT AGE: First visit through seventh visit -- 13. Last visit -- 14.

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
809	03/28/87	845.00	90060	Office and other outpatient medical service, established patient; intermediate service
806	04/11/87	824.8	99500	Special USTF code used for statistical purposes
803	04/14/87	718.17	90015	Office and other outpatient medical service, new patient; intermediate service
806	04/27/87	829.0	99500	Special USTF code used for statistical purposes
807	05/18/87	V54.9	99070	Office and other outpatient medical service, established patient; extended service
2314	09/03/87	V70.3	90050	Office and other outpatient medical service, established patient; limited service
807	09/11/87	V54.9	90070	Office and other outpatient medical service, established patient; extended service
2300	08/19/88	V70.9	99500	Special USTF code used for statistical purposes

CHAMPUS EPISODE
EXAMPLE I

EPISODE DESCRIPTION: Knee injury with physical therapy
EPISODE PERIOD: 03/20/87 to 05/08/87
AVGs FOUND IN DATA: 806 -- Wound, fracture of arm, lower leg, shoulder
DIAGNOSIS ASSIGNED: 836.2 -- Other tear of cartilage or meniscus of knee, current
PATIENT AGE: 63

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
806	03/20/87	836.2	90050	Office and other outpatient service, established patient; limited service
806	04/07/87	836.2	97022	Physical medicine treatment to one area; whirlpool
			97110	Physical medicine treatment to one area, initial 30 minutes, each visit; therapeutic exercises
			97145	Physical medicine treatment to one area, each additional 15 minutes
806	04/10/87	836.2	97022	Physical medicine treatment to one area; whirlpool
			97110	Physical medicine treatment to one area, initial 30 minutes, each visit; therapeutic exercises
			97145	Physical medicine treatment to one area, each additonal 15 minutes
806	04/13/87	836.2	97022	Physical medicine treatment to one area; whirlpool
			97110	Physical medicine treatment to one area, initial 30 minutes, each visit; therapeutic exercises
806	04/15/87	836.2	97010	Physical medicine treatment to one area; hot or cold packs
			97110	Physical medicine treatment to one area, initial 30 minutes, each visit; therapeutic exercises
			97145	Physical medicine treatment to one area, each additional 15 minutes
806	04/17/87	836.2	97010	Physical medicine treatment to one area; hot or cold packs
			97530	Kinetic activities, one area; initial 30 minutes, each visit
806	04/20/87	836.2	97010	Physical medicine treatment to one area; hot or cold packs
			97010	Physical medicine treatment to one area; hot or cold packs
			97530	Kinetic activities, one area; initial 30 minutes, each visit
806	04/24/87	836.2	97530	Kinetic activities, one area; initial 30 minutes, each visit
806	04/27/87	836.2	90050	Office and other outpatient service, established patient; limited service
806	04/28/87	836.2	97022	Physical medicine treatment to one area; whirlpool
			97530	Kinetic activities, one area; initial 30 minutes, each visit
			97531	Kinetic activities, one area; each additional 15 minutes
806	05/05/87	836.2	97022	Physical medicine treatment to one area; whirlpool
			97530	Kinetic activities, one area; initial 30 minutes, each visit
806	05/08/87	836.2	97530	Kinetic activities, one area; initial 30 minutes, each visit
			97531	Kinetic activities, one area; each additional 15 minutes

CHAMPUS EPISODE
EXAMPLE 2

EPISODE DESCRIPTION: Fractured arm
EPISODE PERIOD: 12/23/86 to 03/19/87
AVGs FOUND IN DATA: 806 -- Wound, fracture of arm, lower leg, shoulder
866 -- Foot and ankle, class 2
876 -- Application of casts, splints, and orthoses, class 2
DIAGNOSIS ASSIGNED: 813.4 -- Fracture of radius and ulna; lower end, closed (distal end)
PATIENT AGE: 62

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
806	12/23/86	813.4	90050	Office and other outpatient medical service, established patient; limited service
866	01/15/87	813.4	90050	Office and other outpatient medical service, established patient; limited service
			28605	Treatment of closed tarsometatarsal joint dislocation; requiring anesthesia
876	01/22/87	813.4	90060	Office and other outpatient medical service, established patient; intermediate service
			73100	Radiologic examination (X-RAY), wrist; anteroposterior and lateral views
			29075	Application (of cast); plaster figure of eight, elbow to finger (short arm)
806	02/12/87 to 02/26/87	813.4	90060	Office and other outpatient medical service, established patient; intermediate service
806	02/12/87 to 02/26/87	813.4	90060	Office and other outpatient medical service, established patient; intermediate service
			73100	Radiologic examination (X-RAY), wrist; anteroposterior and lateral views
806	03/19/87	813.4	90060	Office and other outpatient medical service, established patient; intermediate service
			73100	Radiologic examination (X-RAY), wrist; anteroposterior and lateral views

CHAMPUS EPISODE
EXAMPLE 3

EPISODE DESCRIPTION:	Fractured Carpal Bone - Possible complete episode
EPISODE PERIOD:	11/04/85 to 12/26/85
AVGs FOUND IN DATA:	806 -- Wound, fracture of arm, lower leg, shoulder
DIAGNOSIS ASSIGNED:	814.0 -- Fracture of carpal bone(s), closed
PATIENT AGE:	9

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
806	11/04/85	814.0	90505	Emergency department service, new patient; brief service
			99070	Supplies and materials, provided by the physician over and above those usually included
806	11/17/85	814.0	90500	Emergency department service, new patient; minimal service
806	11/25/85	814.0	90060	Office and other outpatient medical service, established patient; intermediate service
806	12/26/85	814.0	90020	Office and other outpatient medical service, new patient; comprehensive service
			81000	Urinalysis; with microscopy

REFERENCES

CHAMPUS EPISODE
EXAMPLE 4

EPISODE DESCRIPTION: Fractured Foot - definite start
EPISODE PERIOD: 05/22/87 to 08/27/87
AVGs FOUND IN DATA: 806 -- Wound, fracture of arm, lower leg, shoulder
DIAGNOSIS ASSIGNED: 825.2 -- Fracture of other tarsal and metatarsal bones, closed
PATIENT AGE: 53

AVG	VISIT DATE/PERIOD	ICD9 CODE	CPT-4 CODE	CPT-4 DEFINITION
806	05/22/87	825.2	90040	Office and other outpatient service, established patient; brief service
			29720	Repair of spica, body cast or jacket
			99070	Supplies and materials, provided by the physician over and above those usually included
806	06/05/87	825.2	90040	Office and other outpatient service, established patient; brief service
806	08/13/87 to 08/27/87	825.2	90050	Office and other outpatient service, established patient; limited service
806	08/13/87 to 08/27/87	825.2	90050	Office and other outpatient service, established patient; limited service
806	08/13/87 to 08/27/87	825.2	90050	Office and other outpatient service, established patient; limited service
806	08/13/87 to 08/27/87	825.2	90050	Office and other outpatient service, established patient; limited service

REFERENCES

Birch and Davis Associates, Inc. *Comparative Analyses of Ambulatory Morbidity in Four Patient Populations*. prepared for Office of the Assistant Secretary of Defense-Health Affairs, Department of Defense, under Contract Number MDA903-88-C-0071, March 1991.

Birch & Davis Associates, Inc./Solon Consulting Group, Ltd. *Assessment of the Utility of Ambulatory Visit Groups as a Tool for Ambulatory Resource Allocation within the Military Health Services System*. prepared for Office of the Assistant Secretary of Defense-Health Affairs, Department of Defense, under Contract Number MDA903-88-C-0071, August 1991.

Garnick, D.W., Luft, H.S., Gardner, L.B., Morrison, E.M., Barrett, M., O'Neil, A., and Harvey, B. "Services and Charges by PPO Physicians for PPO and Indemnity Patients: An Episode of Care Comparison," Medical Care, October 1990, 28(10):894-906.

Gold, M., and Azevedo, D. "The Content of Adult Primary Care Episodes," *Health Reports*, January-February 1982, 97(1): 48-57.

Hornbrook, M.C., Hurtado, A.V., and Johnson, R.E. "Health Care Episodes: Definition, Measurement and Use," Medical Care Review, Fall 1985, 42(2):163-218.

Johnson, R.E., Vogt, T.M., and Penn, R.L. "An Episode Approach to the Care and Costs of Obesity," Journal of Ambulatory Care Management, February 1984, 7:47-58.

Kessler, L.G., Steinwachs, D.M., and Hankin, J.R. "Episodes of Psychiatric Utilization," Medical Care, December 1980, 18(12): 1219-1227.

Lasdon, G.S., and Sigmann, P. "Evaluating Cost-Effectiveness Using Episodes of Care," Medical Care, March 1977, 15(3): 260-264.

Moscovice, I. "A Method for Analyzing Resource Use in Ambulatory Care Settings," Medical Care, December 1977, 15(12): 1024-1040.

Salkever, D.S., Skinner, E.A., Steinwachs, D.M., and Katz, H. "Episode-Based Efficiency Comparisons for Physicians and Nurse Practitioners," Medical Care, February 1982, 20(2): 143-153.